Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Expanding Flexible Use of the	)	GN Docket No. 18-122
3.7 to 4.2 GHz Band	)	

COMMENTS OF MICROSOFT CORPORATION

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SUMMARY

Microsoft Corporation ("Microsoft") urges the Commission to make available nearly 400 megahertz of spectrum in the upper portion of the 3.7 – 4.2 GHz band (the "3.7 GHz band") for licensed P2MP wireless broadband services. In addition, Microsoft urges the Commission to permit opportunistic access in the lower portion of the band for P2MP services. Specifically, Microsoft encourages the Commission to adopt a Report and Order in mid-2019 authorizing: (1) "flexible use" in the 3.7 - 3.8 GHz band; (2) licensed P2MP fixed wireless broadband services on a co-primary shared basis with FSS earth stations from the top of the guard band between the flexible use spectrum and the remaining FSS band (the "guard band") to 4.2 GHz; and (3) opportunistic use on a secondary basis for P2MP fixed wireless broadband services from 3.7 GHz to the top of the guard band.

Microsoft applauds the Commission for recognizing the importance of providing high-speed broadband service to unserved and underserved rural areas, and applauds Chairman Pai for repeatedly identifying the goal of "closing the digital divide" as "his top policy priority as FCC Chairman." As demonstrated by its Airband Initiative, Microsoft shares the Commission's commitment to closing the rural broadband gap.

Creating a new fixed wireless P2MP broadband service in the 3.7 GHz band is an important means for closing the rural broadband digital divide. Fixed wireless broadband is an ideal solution for eliminating the digital divide in rural areas because it can be deployed for a fraction of the capital expense of fiber-to-the-home or cable broadband.

Microsoft submits that the 3.7 GHz band is underutilized primarily as a result of the antiquated "full-band, full-arc" licensing policy which requires protection for every satellite

earth station across the entire 500 megahertz of the 3.7 GHz band regardless of how much of that band the satellite earth station is actually using. Microsoft submits that much of the 500 megahertz of capacity in the 3.7 GHz band lies fallow in many areas across the country. Accordingly, Microsoft fully supports the Commission's proposal to eliminate "full-band, full-arc" protection. To maximize efficient use of the 3.7 GHz band by enabling P2MP operators to share the band with FSS operators, it is essential that FSS earth station operators be required to file additional operational information for existing earth stations.

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Microsoft Corporation ("Microsoft") hereby submits its Comments in response to the above-captioned Order and Notice of Proposed Rulemaking ("Order" or "NPRM", as appropriate).[1]

I. Introduction

Microsoft applauds the Commission for issuing its NPRM proposing, among other things, "to promote more efficient and intensive fixed use of the [3.7 – 4.2 GHz] band …."[2] As the Commission recognized:

> The 3.7 – 4.2 GHz band has excellent propagation characteristics compared to high-band spectrum, offers near line-of-sight capability at low power for last-mile services, and has 500 megahertz of contiguous spectrum to accommodate twenty-five 20 megahertz channels. Such capacity could facilitate the provision by multiple entities of last-mile, fixed wireless broadband connectivity at gigabit or near-gigabit speeds.[3]

[1] *Expanding Flexible Use of the 3.7 to 4.2 GHz Band, Order and Notice of Proposed Rulemaking,* GN Docket No. 18-122, FCC 18-91 (rel. July 13, 2018) (the 3.7 – 4.2 GHz band will be referred to in these Comments as the "3.7 GHz band").

[2] NPRM at ¶ 2.

[3] Id. at ¶ 116.

The Commission further recognized that "fixed wireless services provide an additional opportunity to connect rural communities and to offer competitive wireless alternatives in urban areas."[4]

Microsoft has consistently supported shared use of the 3.7 GHz band for fixed point-to-multipoint ("P2MP") broadband. In its Comments in response to the NOI, Microsoft asked the Commission to extend the upper frequency range of CBRS by 100 MHz, to 3.8 GHz, and for the creation of a new fixed P2MP broadband service that would share the 3.8 - 4.2 GHz spectrum with the Fixed Satellite Service ("FSS").[5] In these Comments, Microsoft encourages the Commission to adopt a Report and Order in mid-2019 authorizing: (1) "flexible use" in the 3.7 - 3.8 GHz band; (2) licensed P2MP fixed wireless broadband services on a co-primary shared basis with FSS earth stations from the top of the guard band between the flexible use spectrum and the remaining FSS band (the "guard band") to 4.2 GHz; and (3) opportunistic use on a secondary basis for P2MP fixed wireless broadband services from 3.7 GHz to the top of the guard band.

II. Providing Broadband Service to Rural Areas Is a Top Priority for the Commission

Microsoft applauds the Commission for recognizing the importance of providing high-speed broadband service to unserved and underserved rural areas,[6] and applauds Chairman Pai for repeatedly identifying the goal of "closing the digital divide" as "his top policy priority as FCC

[4] Id. at ¶ 3.

[5] Microsoft filed Comments on October 2, 2017 and Reply Comments on November 15, 2017 in response to the Commission's Notice of Inquiry, *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24* GHz, GN Docket No. 17-183, FCC 17-104 (rel. Aug. 3, 2017) ("NOI").

[6] NPRM at ¶ 3.

Chairman."[7] As demonstrated by its Airband Initiative, Microsoft shares the Commission's commitment to closing the rural broadband gap.[8] Microsoft reiterates its strong support for creating a new fixed wireless broadband service in the 3.7 GHz band as an important means for closing the rural broadband digital divide.[9]

> We believe a technology model that uses a combination of TV White Spaces spectrum, satellite coverage, and other fixed wireless frequencies, depending on population density, can significantly reduce the initial capital costs and on-going operating costs of providing affordable last mile coverage to rural America.[10]

Fixed P2MP broadband service in the 3.7 GHz band is wholly complementary to TV White Spaces and is an important tool in the toolbox to extend wireline networks and reach more locations or upgrade underserved locations with faster speeds.

Recent Commission reports confirm the lack of fixed broadband availability in rural areas. The Commission's 2018 Broadband Progress Report found that for rural Americans, as of December 2016:

- 16.1% lack access to fixed terrestrial broadband service at 10/1 Mbps
- 30.7% lack access to fixed terrestrial broadband at 25/3 Mbps
- 36% lack access to fixed terrestrial broadband service at 50/5 Mbps.[11]

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[7] Remarks of FCC Chairman Ajit Pai at the Fourth Meeting of the Federal Communications Commission's Broadband Deployment Advisory Committee, Jan. 23, 2018, at 1. *See, also,* Remarks of FCC Chairman Ajit Pai at the Farm Foundation/U.S. Department of Agriculture Summit, April 18, 2018, at 1 ("On my first day as FCC Chairman in January 2017, I said that my number one priority was closing the digital divide and bringing the benefits of the Internet age to all Americans.").

[8] *See*, A Rural Broadband Strategy, Connecting Rural America to New Opportunities, Microsoft, May 2017, https://blogs.microsoft.com/uploads/2017/07/Rural-Broadband-Strategy-Microsoft-Whitepaper-FINAL-7-10-17.pdf

[9] *See* Microsoft Comments, filed October 2, 2017, in response to the NOI, at 2.

[10] Microsoft Comments at 7.

[11] *2018 Broadband Deployment Report*, FCC 18-10 (2018), at Table 4.

Overall, the report found that more than 24 million Americans lack access to fixed terrestrial broadband at 25/3 Mbps.[12]

The *2016 Broadband Progress Report* also found a correlation between broadband access and household income, concluding that "[o]n average, the proportion of the population with access to [fixed terrestrial service at 25/3 Mbps and mobile LTE] is highest in counties with the highest median household income, the highest population density, the lowest poverty rate, and the lowest rural population rate."[13] As Chairman Pai has stated, "[i]n urban areas 98% of Americans have access to high-speed fixed service. In rural areas, it's only 72%. 93% of Americans earning more than $75,000 have home broadband service, compared to only 53% of those making less than $30,000."[14] Chairman Pai concluded that:

> If you live in rural America, you are much less likely to have high-speed Internet service than if you live in a city. If you live in a low-income neighborhood, you are less likely to have high-speed Internet access than if you live in a wealthier area. The digital divide in our country is real and persistent.[15]

Fixed wireless broadband is an ideal solution for eliminating the digital divide in rural areas because it can be deployed for a fraction of the capital expense of fiber-to-the-home or cable broadband.

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[12] *Id.* at ¶ 50.

[13] *See 2018 Broadband Progress Report* at ¶ 62.

[14] Remarks of FCC Chairman Ajit Pai at "Broadband for All" Seminar, Stockholm, Sweden, June 26, 2017, at 1.

[15] Remarks of FCC Chairman Ajit Pai at the American Enterprise Institute, *The First 100 Days: Bringing the Benefits of the Digital Age to All Americans*, May 5, 2017, at 2.

III. The 3.7 GHz Band is Grossly Underutilized and the Commission Should Expeditiously Take Action to Increase Utilization

A. The Commission Should Eliminate "Full-Band, Full-Arc" Interference Protection

Microsoft submits that the 3.7 GHz band is underutilized "primarily as a result of the antiquated "full-band, full-arc" licensing policy which requires protection for every satellite earth station across the entire 500 [megahertz] of the 3700 – 4200 MHz band" regardless of how much of that band the satellite earth station is actually using.[16] Microsoft submits that much of the 500 megahertz of capacity in the 3.7 GHz band lies fallow in many areas across the country. Accordingly, Microsoft fully supports the Commission's proposal to eliminate "full-band, full-arc" protection by providing that:

> for purposes of interference protection, earth station operators will be entitled to protection *only* for those frequencies, azimuths, and elevation angles and other parameters reported as in regular use (*i.e.* at least daily) in response to future information collections ….[17]

The recent willingness of the C-Band Alliance to clear 200 megahertz of the 3.7 GHz band for flexible use, purportedly within 18 – 36 months, is indicative of the gross underutilization of the spectrum.[18]

[16] Comments of the Broadband Access Coalition ("BAC"), filed on October 2, 2017 in response to the NOI, at 6. *See also,* Comments of Verizon at 12 ("a robust record demonstrates that the existing "full-band, full-arc" licensing structure is spectrally inefficient").

[17] NPRM at ¶ 39 (emphasis added).

[18] *See* "C-Band Alliance Increases to 200 MHz Its FCC Proposal for Spectrum Repurposing in the U.S. to Support Nationwide 5G Deployment," Press Release, Oct. 22, 2018.

B. The Satellite Earth Station Database Needs to be Updated as Soon as Possible

The Commission has taken an important first step by requiring in its Order that any 3.7 GHz band earth station seeking interference protection must register with the Commission.[19] To ensure compliance, the Commission proposes that only operational FSS earth stations (as of April 19, 2018) that are licensed or registered in the IBFS database (or have a pending application) and have timely provided the required certification to the Commission will receive protection.[20] Microsoft agrees with both the Commission's definition of incumbent stations and the proposed requirements for FSS stations seeking interference protection.

It is necessary for the Commission to take a firm stance regarding the timely filing of data regarding FSS earth station operations. It is equally important for the Commission to enforce its rules. Microsoft has experience in a different frequency band where operators are required to register with a frequency coordinator in order to receive interference protection, but some operators choose not to register. Operators who choose not to register frustrate implementation of the Commission's rules And yet, these operators have faced no enforcement, and no repercussions, for their failure to comply with the Commission's rules.

The Commission must now take the next step, by adopting its proposal to "develop a more complete record on existing FSS operations in [the 3.7 GHz] band [by requiring] earth station operators to file additional information on their existing facilities."[21] To maximize efficient use of the 3.7 GHz band by enabling P2MP operators to share the band with FSS

[19] Order at ¶¶ 18 – 22.

[20] NPRM at ¶¶ 27 - 29.

[21] NPRM at ¶ 41.

operators, it is essential that FSS earth station operators be required to file additional operational information for existing earth stations. In particular, FSS earth station operators must be required to provide the specific frequencies or transponders in use on a daily basis. With that data, prospective P2MP operators will be able to identify spectrum and geographic areas where they can operate without causing harmful interference to incumbent FSS earth station operators. For this reason, it is critical that the Commission collect this data on a nationwide basis. This data is readily available to FSS earth station operators and will not represent an undue burden. And, of course, it is essential that the data for FSS earth stations remain accurate and up-to-date.

C. More Realistic Interference Protection Levels Need to be Developed and Implemented

The Commission needs to develop more realistic protection levels for satellite earth stations. In particular, Microsoft agrees with Nokia that real-world attenuation from natural and man-made obstacles, such as terrain, foliage and buildings, must be taken into account "when determining the potential interference into FSS earth stations from terrestrial systems."[22] In addition, Microsoft encourages the Commission to review the interference protection levels accorded to FSS earth stations. As Nokia noted, "[t]hese criteria were self-derived by the FSS industry at the ITU decades ago, with little or no consideration of other services, and modern spectrum use and management."[23]

[22] Nokia Comments, filed October 2, 2017, in response to the NOI, at 9.

[23] *Id*.

In its CBRS proceeding, the Commission has already conducted an evaluation and determined the protection criteria necessary to enable co-channel and adjacent channel terrestrial use of C-band FSS spectrum.[24] The Commission should use the protection requirements for FSS operations to enable sharing in the CBRS band as the basis for protection requirements for FSS operations to enable sharing with P2MP operations in the 3.7 GHz band.

D. Automated Frequency Coordination Will Maximize Shared Use of the Band

In its Comments, Microsoft recognized that "the simple and proven mechanism proposed [by BAC] under Part 101 … will allow the new fixed broadband service to be initiated immediately."[25] We believe that the current process needs to be slightly amended, by requiring an expedited coordination process with mandatory electronic notification and response. After an appropriate transition period, the mandatory electronic notification and response coordination process should be replaced by an automated frequency coordination process to be developed by a multi-stakeholder process, including FSS operators. Microsoft agrees with Google that an "automated admission system would modernize the manual coordination process that is now codified in Part 101 …."[26] As Google noted, "interference calculations … are particularly straightforward because the locations of both the earth stations and [Fixed Broadband Access] systems would be well-known, and their operational parameters well-characterized."[27] Microsoft continues to believe, however, that there is no need for a coordination system as complex as the Spectrum Access System ("SAS") developed for the CBRS

[24] *See* Federated Wireless Comments, filed October 2, 2017, in response to the NOI, at 3.

[25] Microsoft Comments at 9.

[26] Google Comments, filed October 2, 2017 in response to the NOI, at 10.

[27] Id. at 9, 11.

band, as it would be overkill for 3.7 - 4.2 GHz band. The SAS was developed to dynamically re-assign shared frequencies, to accommodate mobile users, and to protect federal radar systems. As a result, the SAS is far more complex than any automated system needed for P2MP operations in the 3.7 GHz band, where operators will be transmitting from fixed points to other fixed points.

IV. Fixed P2MP Service Should be Licensed in the Upper Portion of the 3.7 GHz Band

Fixed P2MP wireless broadband service should be licensed on a co-primary basis with incumbent FSS earth stations from the top of the guard band to 4.2 GHz. As set forth above, fixed P2MP licensees would need to successfully complete the frequency coordination process, to ensure that no harmful interference will be caused to incumbent FSS earth station operators, before deploying. In order to accommodate re-packing into the upper portion of the band and situations where a satellite operator has to switch transponders, P2MP equipment should be required to be operable across the entire 500 megahertz and connected to the database.

V. Opportunistic Access by P2MP Providers to the Flexible Use Portion of the 3.7 GHz Band and to the Guard Band Should Be Permitted

Microsoft recommends that the Commission authorize opportunistic use by P2MP providers band from 3.7 GHz to the top of the guard band. Such opportunistic use will ensure efficient use of the entire 3.7 GHz band without delaying, or interfering with, the deployment of flexible use services. Our proposal is consistent with the Commission's 'use-or-share' approach for the Citizens Broadband Radio Service.

Opportunistic use of the lower portion of the band should be permitted during the multi-year period required for clearing the lower portion of the band and then deploying flexible use services into this portion of the band. There is no reason to let over 100 megahertz

of spectrum lie fallow during the transition period. Before using the spectrum, P2MP operators would be required to successfully complete frequency coordination to ensure that incumbent FSS earth station operators are protected from harmful interference. And, of course, P2MP operators would be required to vacate the spectrum upon deployment of flexible use services in the geographic area where they are operating.

Opportunistic use of the lower portion of the band should also be permitted in geographic areas where flexible use services are not deployed, even after the incumbent FSS earth stations have all been re-packed into the upper portion of the band. Microsoft fully anticipates that flexible use services will primarily be deployed in more densely populated urban areas for providing additional broadband capacity, leaving this spectrum largely fallow in less densely populated rural areas. In particular, if the Commission decides to pursue the private market mechanism as the means for repurposing the lower part of the 3.7 GHz band, it should permit P2MP on an opportunistic, use-or-share basis, particularly in rural areas where "flexible use" licensees may have no interest in operating, as the public interest component to the private transaction. Finally, opportunistic use should be permitted in the guard band between flexible use and FSS. Again, there is no reason to allow this spectrum to lie fallow if P2MP operators can successfully coordinate with adjacent channel FSS operations.

Microsoft strongly opposes any requirement to "lock out" the flexible use portion of the 3.7 GHz band.[28] A "lock out" requirement would be wholly inconsistent with providing P2MP

[28] NPRM at ¶ 128.

operators with opportunistic access to the flexible use and guard band portions of the band, as explained above.

VI. The Commission Should Mandate the Establishment of a Relocation Fund

Regardless of whether the lower portion of the 3.7 GHz band is repurposed through an auction or a private transaction, Microsoft urges the Commission to establish a relocation fund to reimburse incumbent earth stations operators for reasonable relocation costs, including, but not limited to, new filters and the installation costs for such filter, and technical and engineering assistance.[29] Microsoft believes it is a matter of fairness, especially given the amount of money that is likely to change hands. The relocation fund should be paid either directly by the FSS operators or as a small percentage of the private transactions.

VII. The Commission Should Not Renew the CF Licenses Operating in the 3.7 GHz Band But Give The MG Licenses The Option To Relocate To The Upper Portion Of The Band

The ULS database reveals that there are 115 Fixed Service licenses operating in the 3.7 GHz band. One hundred and eight of the licenses are for common carrier fixed point-to-point microwave (CF) links and 7 licenses are for microwave / industrial business pool (MG). Some of the CF licenses are for individual sites, while others are for entire states and even multiple states. Many of the CF licensees are the same parties that may benefit from spectrum in the 3.7 - 4.2 GHz band being made available for flexible use. The expiration dates for these CF licenses range between June 2019 and February 2021, with the vast majority occurring in the year 2020. Microsoft submits that these links have out served their purpose, and thus, the Commission should not renew the licenses. Microsoft recommends that the seven MG license

[29] *Id*. at ¶ 29.

holders be given the option to move to the upper portion of the 3.7 - 4.2 GHz band as long as each agrees to operate its links on a TDD basis. If the Commission creates a relocation fund, the seven MG licensees should be eligible to draw from it for reasonable relocation expenses.

VIII. Conclusion

For the reasons set forth above, Microsoft urges the Commission to make available nearly 400 megahertz of spectrum in the upper portion of the 3.7 GHz band for licensed P2MP wireless broadband services. In addition, Microsoft urges the Commission to permit opportunistic access in the lower portion of the band for P2MP services.

Respectfully submitted,

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